99185

PROPOSED PLAN FOR THE
SKINNER LANDFILL SITE, WEST CHESTER, OHIO

I. Introduction

This Proposed Plan identifies the preferred option for cleaning up the contamination at the Skinner Landfill site. In addition, the Plan summarizes other alternatives that were considered and analyzed for this site. This document is issued by the U.S. Environmental Protection Agency (EPA), the lead agency for site activities, and the Ohio Environmental Protection Agency (OEPA), the support agency for this response action. The U.S. EPA, in consultation with OEPA, will select a final remedy for the site only after the public comment period has ended and the information submitted during this time has been reviewed and considered.

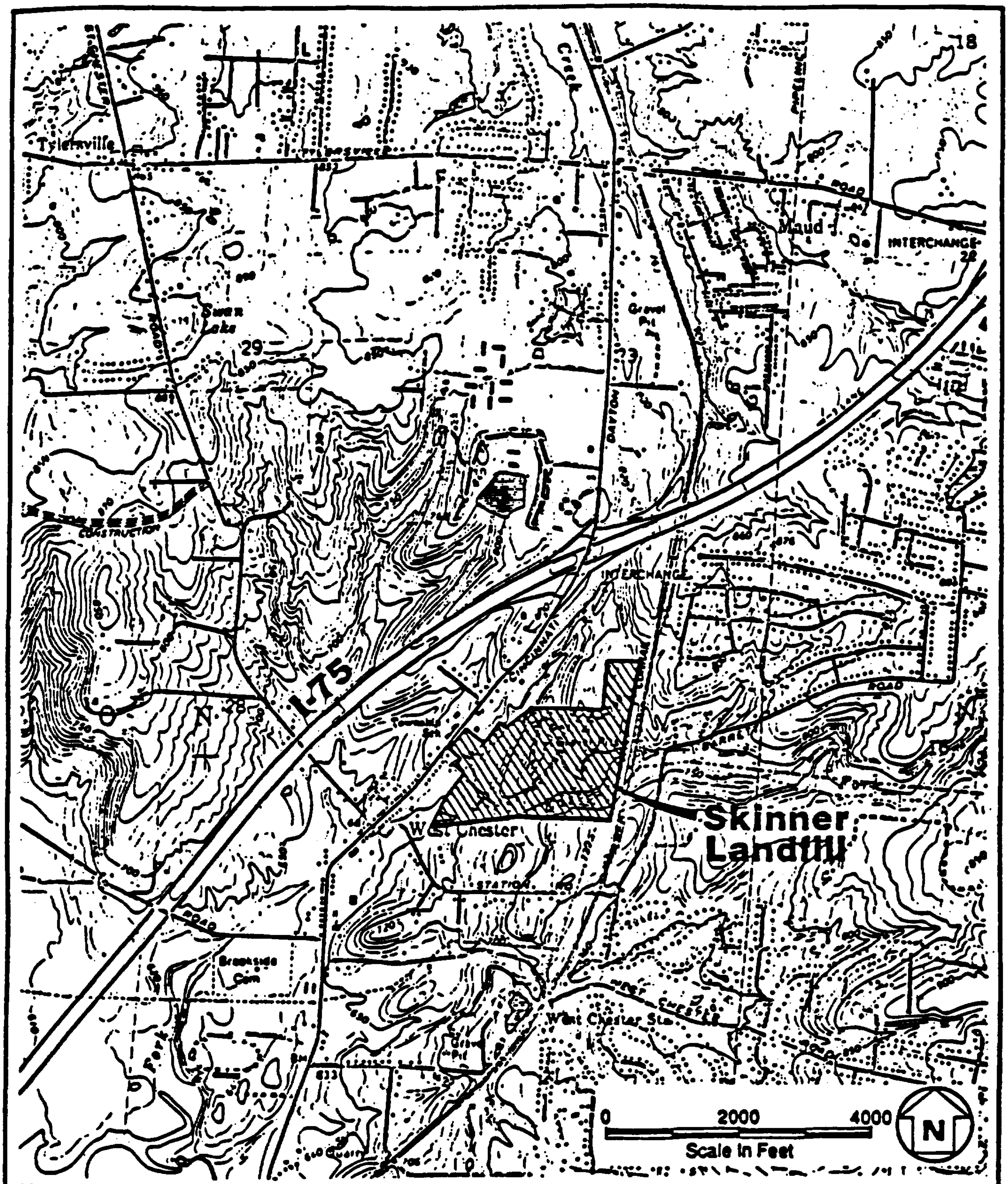
EPA is issuing this Proposed Plan as part of its public participation responsibilities under section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The purpose of this Proposed Plan document is specifically to: identify the preferred alternative for remedial action at the site and the rationale therein; describe the other remedial options that were considered by the agencies in the Feasibility Study (FS) report; solicit public review and comment on all the alternatives described in the FS; and, provide information on how the public can be involved in the remedy selection process.

This document is intended to merely summarize and highlight key information which is presented in greater detail in the Remedial Investigation (RI) and FS reports, and other site documents contained in the administrative record file for this site. Therefore, EPA and the OEPA encourage the public to review these other documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted there. Information about the locations of these document repositories is located on page 21 of this Proposed Plan document.

EPA, in consultation with the OEPA, may modify the preferred alternative or select a different response action as the final remedial action plan for the site, based on new information, arguments or comments submitted during the public comment period. Therefore, the public is encouraged to review and comment on all the alternatives identified in this Plan.

II. Site Background

The Skinner Landfill is located approximately 15 miles north of Cincinnati, Ohio, in Section 22 of Butler County (see Figure 1)



Map copied in part from USGS Glendale Quadrangle (7.5 minute)

FIGURE 1

LOCATION OF SKINNER LANDFILL

and is situated approximately one-half mile south of the intersection of Interstate 75 and the Cincinnati-Dayton Road, and one-half mile north of the town of West Chester.

The Skinner property is comprised of nearly 78 acres of hilly terrain, bordered on the immediate south by the East Fork of Mill Creek. The site is bordered to the north by woods and old fields, to the east by a Consolidated Rail Corporation (Conrail) right-of-way, to the south across the East Fork of Mill Creek by agricultural and wooded land and to the west by the Cincinnati-Dayton Road. The principal residential area is west of the landfill; however, approximately 13 residences are located within 2,000 feet of the landfill to the south, and west. A residential area is also located approximately 0.5 miles east of the landfill (see Figure 2).

The property, originally used as a sand and gravel operation, first became involved in landfill operations in 1934 with the disposal of general municipal refuse in abandoned sand and gravel pits. It is unknown exactly what materials were deposited in the landfill from 1934 until the present. In 1959, the landfill was used for the disposal of scrap metal and general trash from a paper manufacturing plant. In the spring of 1963, the Butler County Board of Health approved the use of the site as a sanitary landfill. However, during the permitting procedure, local residents opposed the landfill, stating that chemical wastes were being dumped there.

In April of 1976, numerous citizen complaints and the observation of a black, oily liquid in a waste lagoon on the site prompted the OEPA to investigate the Skinner Landfill. This and subsequent visits showed evidence of a waste lagoon occupying about 1.5 acres, and several hundred drums scattered throughout the site. Mr. Albert Skinner has also stated that nerve gas, mustard gas, incendiary bombs, phosphorus, flame throwers, cyanide ash and explosive devices were buried at the landfill.

Analysis of samples taken from a trench excavated at the lagoon site revealed pesticides, some volatile organic compounds and elevated concentrations of several heavy metals. In January 1979, the court prohibited future disposal of industrial waste at this site except under legal permit.

In 1982, as a result of a Field Investigation Team (FIT) investigation, which revealed volatile organic compounds in ground water southeast of the buried lagoon, the Skinner Landfill was placed on the National Priority List (NPL) with a ranking of 659. This action prompted the initiation of a RI/FS with Phase I activities commenced by EPA in the Spring of 1986. This initial investigation included a geophysical survey, and the sampling of ground water, surface water, and soils. A biological survey of the diversity of fish and macroinvertebrate fauna collected from

SITE MAP
Skinner Landfill

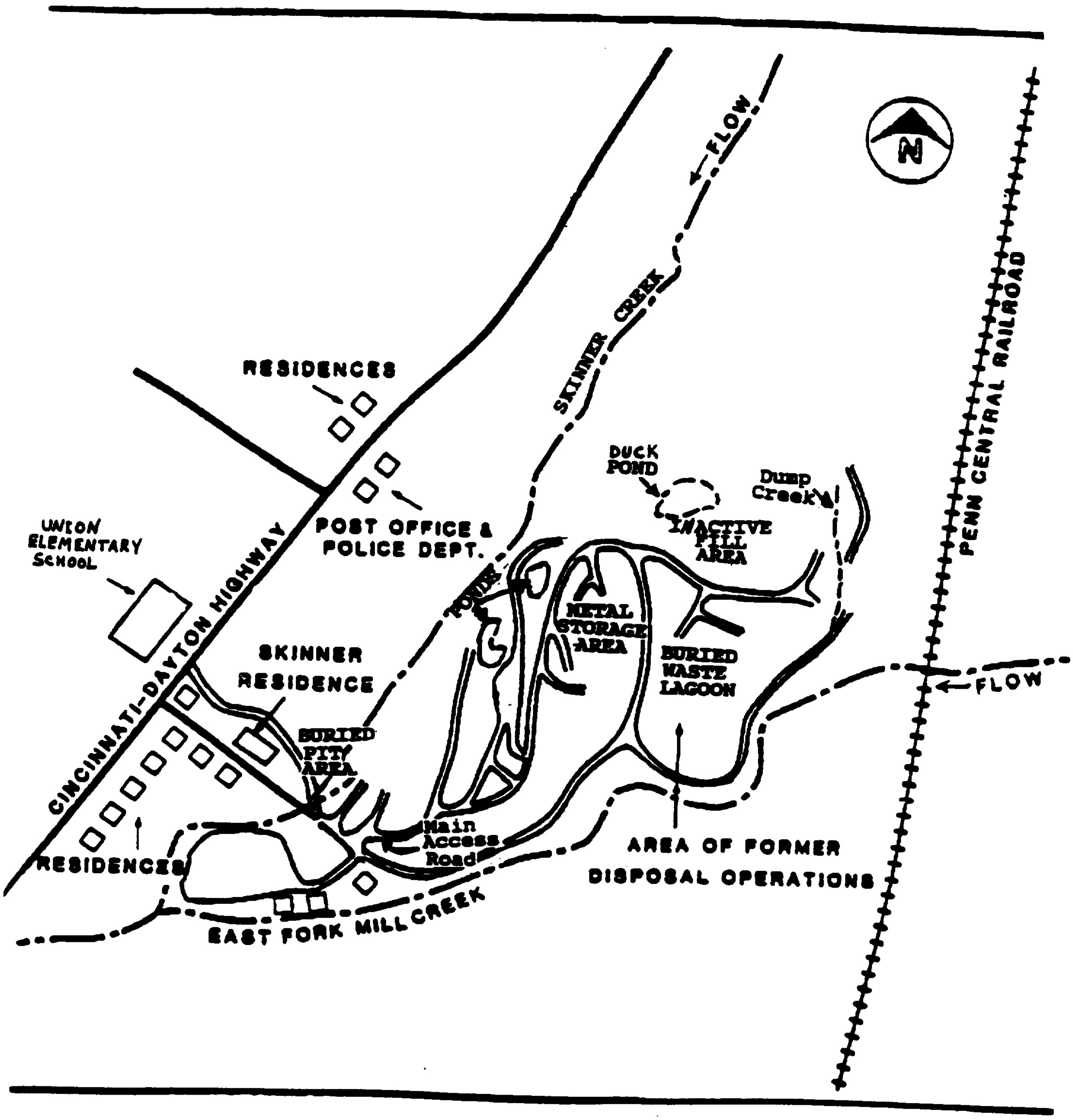


FIGURE 2

the East Fork of Mill Creek and Skinner Creek was performed.

Phase II of the RI/FS commenced in 1989 and further investigated the ground water, surface water, soils and sediments at the site. The predominant areas of investigation outside the landfill included residential wells near the landfill and the East Fork of Mill Creek upstream and downstream of the site. The OEPA achieved site closure to all landfilling activities in August 1990. The landfill currently covers about 10 acres.

III. Summary of Site Risks

Because the Skinner Landfill accepted a variety of wastes since 1934 until it was closed in 1990, numerous chemicals have been detected at the site. Following the RI, an analysis was conducted to estimate the potential health or environmental problems that could result if the site was not cleaned up. This analysis is referred to as the Baseline Risk Assessment (RA). In this assessment, approximately 166 contaminants representing essentially all classes of chemicals including: inorganic, volatile and semi-volatile organic, pesticides, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), dioxins and furans were evaluated for carrying through the risk assessment. Of these, 114 contaminants were retained from these chemical classes for use in assessing site risks. These chemicals can be found on Table 3-1 of the RA Report. Those contaminants contributing the most significantly to current and future site risks included: volatile organics such as carbon tetrachloride, vinyl chloride, benzene, chloroform, dichloroethene and bis (2-chloroethyl) ether; pesticides such as heptachlor, aldrin, dieldrin, chlordane, chlordene, and hexachlorobenzene; PCBs, specifically Arochlor 1254, and inorganics such as arsenic and cobalt.

The most highly contaminated media included the soils of the buried waste lagoon. Lower levels of contamination were found in the remaining site-wide soils which included the buried pit area. Lower levels of contamination were also found in the ground water and in the sediments in Mill Creek, Skinner Creek, and the Duck and Diving Ponds. Additional contamination may be from drums located north of the buried waste lagoon which were sampled in 1976 and 1986.

The remaining portions of the landfill contain smaller quantities of solid and industrial waste mixed with larger quantities of demolition materials. However, ground water monitoring wells located within the landfill indicate that the landfill is also a source of contamination. Leachate is created at this site when rain water or melting snow percolates through the waste lagoon and landfill. The majority of compounds in the waste lagoon are largely immobile, because they bind tightly to the clayey soils below the waste lagoon and are not dissolved by water. However, mobile VOC compounds in permeable zones beneath the waste lagoon have been detected. These compounds are apparently mobile in the water table and in perched ground water zones above impermeable layers. Contamination of the bedrock layer was minimal.

The majority of ground water contamination in the unconsolidated sediments appears to originate from within the buried waste lagoon. Additional sources may exist to the north and east of the buried waste lagoon as well as upgradient of the Skinner production well in the buried valley. Two wells located immediately adjacent to, and downgradient from, the lagoon are the most impacted. These wells contain a wide variety of contaminants with the majority being volatile organic and chlorinated semi-volatile organic compounds. Three wells located within the landfill indicated elevated levels of primarily benzene. Ground water monitoring wells located downgradient of the waste lagoon and landfill, and adjacent to the East Fork of Mill Creek, show considerably fewer contaminants and at much lower concentrations.

Surface water contamination is minimal in all ponds and creeks. However, pond and creek sediments contain low levels of some semi-volatile organic compounds, PCBs, arsenic, and pesticides. The most likely reason for the contamination is due to surface water runoff from the site.

The potential migration pathways for these contaminants include leaching from the soils to the ground water, movement of contaminated ground water to surface water and sediments, and volatilization of chemicals to air from water and soils. Sampling has indicated that concentrations of volatile chemicals in surface soils and water do not represent a significant source of concern for air. Additionally, the depth of contaminated soils in the waste lagoon limits emissions of these chemicals to air.

The only evidence of contaminants potentially leaving the site through ground water migration was the detection of ethylbenzene at low levels located across the East Fork of Mill Creek from the buried lagoon. The only potential off-site routes of migration for surface water and surface water sediments are through the East Fork of Mill Creek and Skinner Creek. The leachate seeps and ground water discharges into the East Fork of Mill Creek appear to originate from within the buried waste lagoon and clearly indicate a pathway for off-site migration of contaminants.

The RA showed that the potential routes of current and future exposure include: ingestion of and direct contact with contaminated soils; ingestion of affected ground water; dermal contact with ground water; inhalation of chemicals that volatilize from ground water to air during showering; and, ingestion of and direct contact with surface water and sediments during recreational activities. Inhalation of fugitive dust and volatile chemicals was also evaluated qualitatively as a potential exposure route but did not warrant a quantitative assessment because emissions from surface soil would likely be low. This is because the most contaminated portion of the site, the buried waste lagoon, is beneath 40 feet of demolition debris and is not considered a source of air risk under the current conditions.

Risks at Superfund sites are typically assessed with respect to both carcinogenic and noncarcinogenic adverse effects of a chemical under current and future exposure scenarios. The current and potentially exposed populations are occupational workers at the site, residents living on and near the site, and persons who may recreate in the area. Cancer risks from various exposure pathways are assumed to be additive. The RA showed that currently none of the residents living, working, recreating, or attending school **near** the site are exposed to any site-related risks considered unacceptable by the U.S. EPA. Unacceptable risks are those that may result in one additional cancer case in 10,000 to 1,000,000 people exposed over a lifetime (70 years). However, the risks to persons currently living, working or recreating **on** the site are considered unacceptable in that they exceed one additional cancer case in 100 persons exposed over a lifetime.

The primary future potentially exposed populations are residential, recreational and occupational. The risks for the future potentially exposed residential population were assessed using both the assumptions that the waste lagoon was and was not developed for residential use. The future risks calculated for persons living working or recreating at the site were considered unacceptable in that they exceeded U.S. EPA's acceptable risk range. The risks under the assumption that the waste lagoon is developed for future residential use exceeded one additional cancer case in 100. The risks under the assumption that the waste lagoon was not developed for future residential use were slightly lower, but still exceeded one in 1,000.

The noncancer risks are evaluated with respect to a hazard quotient, which is the ratio of the level of exposure to an acceptable level. If the hazard quotient for an exposed individual or group exceeds 1.0 for a particular chemical, there may be noncancer health effects resulting from the exposure to that chemical. If the hazard index, which is the sum of the hazard quotients for all chemicals in a particular medium, exceeds 1.0 there may be a concern for potential health effects from exposure to that medium. The RA showed that the hazard indices at the Skinner site exceeded 1.0, suggesting that both current and future exposures to chemicals of concern on the site may result in excess noncancer risks to all populations. Releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other measures discussed in this plan, may present an imminent and substantial endangerment to public health, welfare, and the environment.

IV. Scope and Role of Response Action

CERCLA provides a preference for achieving protection of human health and the environment through treatment which permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants and contaminants over remedial action not involving such treatment.

The preamble to the National Contingency Plan (NCP), March 8, 1990, states that treatment is the preferred alternative for the remediation of hazardous wastes. However, the NCP identifies the municipal landfill as a type of site where treatment of principal threats may not always be practicable due to difficulties in treating the volume or types of waste involved. Another difficulty could be short-term risks associated with the treatment remedy.

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. They include liquids, highly mobile materials (e.g. solvents), or materials having high concentrations of toxic compounds.

According to the February 1991 guidance, "Conducting Remedial Investigation/Feasibility Studies for CERCLA Municipal Landfill Sites", treatment of hot spots within a landfill may be considered practicable when wastes are in discrete, accessible locations of the landfill and present a potential principal threat to human health and the environment.

The preamble to the NCP also states that solutions will most often involve a combination of methods of providing protection, including treatment and engineering controls and institutional controls.

V. Cleanup Objectives

Waste Lagoon

Based on interviews conducted by U.S. EPA, OEPA file information and RI data, it appears that the waste lagoon was the primary dumping area for hazardous waste or waste containing hazardous substances from 1955 to 1976. Furthermore, 55-gallon drums are buried near the vicinity of the waste as witnessed by OEPA in 1976. Based upon geophysical surveys conducted under Phase 1 and aerial photos of the site in 1976, it appears possible that as many as 7,000 drums of waste could be buried in this area.

The waste lagoon sediments contain highly toxic compounds including various pesticides, dioxins and furans. Also, based on limited data from the OEPA inspection in 1976, the buried drums contain liquid and non-liquid solvent and pesticide wastes. Furthermore, waste lagoon sediments contain various mobile solvent compounds. Based on the RI data to date, compounds associated with solvents are migrating from the waste lagoon and discharging to Mill Creek. Significant migration has been hindered, to date, by the clayey soils under most of the waste lagoon and because the waste lagoon is normally wholly above the water table. Current data also suggests, however, that at some time in the past, significant amounts of contaminants may have migrated to the East Fork of Mill Creek through sand and gravel layers in contact with the southern end of the waste lagoon.

According to the RA Report, incremental cancer risks associated with future exposure to the waste lagoon sediments under a residential scenario are estimated to be as high as 2.0×10^{-2}. Incremental cancer risk under a future recreational exposure scenario are estimated to be as high as 1.6×10^{-2}. The RA also indicates potential future migration of contaminants from the waste lagoon area to ground water and the East Fork of Mill Creek at higher quantities than what is currently being released.

The waste lagoon sediments and drum contents are potential principal threats due to their highly toxic and mobile nature. Thus, treatment and/or containment of the principal threats were carried forward through detailed analysis. The cleanup objective for the waste lagoon is as follows:

- To address principal threats, minimize release of contaminants to groundwater, and minimize direct contact threat by removal and treatment and/or containment of hot spots.

Landfill Contents

As stated earlier it appears that the waste lagoon was primarily used to dump hazardous wastes. The remaining property used as a landfill was not purchased until 1963. Based on visual inspection and site records, it appears the landfill area was used to dump primarily solid and demolition waste mixed with much smaller quantities of industrial/hazardous waste. Because the landfill area is composed of municipal waste and to a lesser extent hazardous waste, it poses a low-level threat rather than a principal threat. The volume and heterogeneity of the landfill waste, as is the case with most CERCLA municipal landfills, make treatment impractical; therefore, containment of the landfill contents was carried forward through detailed analysis. The cleanup objective for the landfill contents is as follows:

- Minimize releases of contaminants to groundwater and minimize direct contact threat by treatment and/or containment of the landfill contents and removal of hotspots.

Soils Outside of Buried waste Lagoon Area

Because chemical-specific ARARs for soil have not been developed, remedial action levels have been developed and proposed based on risk-based criteria, U.S. EPA guidance and water quality ARARs. Water quality ARARs are used because remedial action objectives for soils must also be protective of ground water. Soil contamination is not acceptable at concentrations where leaching of contaminants from soils to ground water can create ground water contamination exceeding the remedial action levels proposed for this site.

These remedial action levels were developed based on a comparison between soil concentrations which are protective of ground water and risk-based standards for soils generated in the Baseline Risk Assessment. The more stringent of these two concentrations were proposed as remedial action levels. The proposed remedial action objective for onsite soils outside of the buried waste lagoon is the following:

- Reduce contaminant leaching from onsite soils in the areas containing contaminants at concentrations above proposed remedial action levels; and, minimize direct contact threat.

Ground Water/Landfill Leachate

Maximum concentrations of contaminants considered acceptable in ground water and leachate were determined from comparisons of risk-based acceptable concentrations and site ARARs. Where both risk-based maximum acceptable concentrations and ARARs could be established for a given contaminant, the most stringent was applied. Site ground water, particularly in the vicinity of the buried waste lagoon, has been impacted by contaminants. Ground water discharge to surface water occurs in the form of springs and seeps along creek valley walls. Leachate seeps also occur along valley walls. For the purposes of evaluating and implementing remedial actions, no distinction was made between impacted ground water and landfill leachate at this site; therefore, ground water and landfill leachate have been treated as a single medium.

Remedial action objectives for ground water and landfill leachate are proposed as follows:

- Containment and/or capture of all ground water and landfill leachate containing contaminant concentrations exceeding the proposed remedial action levels which would result in an excess lifetime cancer risk exceeding 10^{-6}, or would result in a cumulative hazard index exceeding 1.0.

- Minimize the volume of ground water in which contaminant concentrations exceed the remedial action levels by minimizing contact of unimpacted water with impacted ground water and soils.

- Minimize migration of dissolved vapor phase ground water contaminants via engineering controls.

Surface Water

Surface water contamination has been primarily attributable to leachate seeps; however, no contamination has been detected in the water of ponds or creeks which exceeds chemical-specific ARARs. The remedial action objectives proposed for ground water and leachate are therefore expected to be protective of onsite surface water as well. Another potential source of contamination to surface water would be surface water runoff from the site, and erosion of site soils. The remedial action objective for surface water is as follows:

- Control of surface water runoff and erosion of site soils which may impact surface water.

Surface Water Sediments

The sources of contaminants that have impacted surface water sediments at the site are undefined. Feasible source mechanisms of detected contamination in surface water sediments include: runoff of precipitation from impacted surface drainage areas; discharge of contaminated ground water; and, transportation of contaminants from upstream sources. Containment of the landfill and buried waste lagoon area by capping would eliminate potential sources of surface runoff. Additionally, remedial actions which would minimize the volume of ground water and landfill leachate from the buried waste lagoon area will reduce any contamination of surface water sediments in the creeks.

Estimated risks posed by the pond sediments do not exceed a carcinogenic risk of 10^{-6} nor do hazard indices exceed 1.0. Creek sediments for certain exposure scenarios are slightly higher; however, removal of creek sediments is not considered to be a reasonable alternative because of the relatively small benefits from removal of the sediments as compared to the removal action's anticipated long-term detrimental effects to the aquatic habitat. Therefore, the remedial action objective for surface water sediments is proposed as the following:

- Natural attenuation of contaminants currently present in the creek and pond sediments by elimination of all sources originating from the Skinner Landfill site.

Landfill Gas/Ambient Air

Landfill gas is known to be emanating from the disposal contents, but the nature and volume of gas has not been quantified. Ambient air contamination has not been determined to be a specific problem on the Skinner site. Future remedial actions, however, may increase the extent to which contaminants would be expected to be discharged to the atmosphere from the landfill waste. The remedial action objective for onsite ambient air is proposed as the following:

- Air discharges from any proposed remedial action will be in compliance with applicable State and Federal regulations.

VI. Summary of Alternatives

All of the alternatives, except for the No Action alternative, described in this section possess the following common elements:

A) Institutional Controls: These controls include fencing at the site boundaries and any areas occupied by the remedy to minimize potential exposure of the general public to contaminants. About 6,600 feet of 6-foot high fencing would be installed. Deed restrictions will limit further excavation, construction or well installation in the area, especially on and near the waste lagoon and landfill areas once capping is completed.

B) Water will be supplied to families living on site by running a township water main to the in-place distribution system on the Skinner property. Water will also be supplied to other residents (about four residences) downgradient of the site whose wells have the potential to become affected.

C) Ground Water Diversion: Two cement-bentonite or soil-bentonite slurry walls will be used to restrict ground water flow. One wall will be placed near the northern site boundary to restrict ground water flow through the buried lagoon area from upgradient sources. The upgradient groundwater would be diverted on the northern side of the slurry wall using an interceptor trench running along the entire length of the slurry wall. The second slurry wall will be placed between Mill Creek and the interceptor trench on the south side of the site.

D) Surface and Storm Water Diversion, Flood Control: Capping of the site would include the buried waste lagoon, the most recently active fill area, and adjacent (including easement) portions of the site. Capping of adjacent areas would allow for the appropriate slopes necessary to minimize infiltration and erosion. The site topography would be modified via grading and installation of a concrete retaining wall on the southern cap boundary to allow for the appropriate slopes and surface water controls. The retaining wall would be designed to withstand a 100-year flood.

E) Ground Water and Surface Water Runoff Monitoring: A monitoring program would be implemented to verify that migration of contaminants and surface water infiltration are effectively controlled.

Alternative 1: No Action

CERCLA requires that a "No Action" alternative be considered as a basis upon which to compare other alternatives. Under this alternative, no remedial action would take place and the site would remain in its present condition. All contamination would remain in the surface and subsurface soils, sediments, ground water and surface water. This alternative would not comply with State and Federal Applicable or Relevant and Appropriate Requirements (ARARs) and would not adequately protect human health or the environment. There would be no cost involved under this alternative.

Alternative 2: Removal and On-Site Treatment of Buried Waste Lagoon Soils; Capping; Collection and Above-Ground Treatment of Ground Water

Under this alternative, the most contaminated soils of the buried waste lagoon would be excavated and incinerated onsite via rotary kiln incinerator. Other impacted site soils would be excavated and consolidated beneath a common site-wide multi-media cap. The multi-media cap, which would consist of clay, a synthetic membrane, a biotic barrier and appropriate cover material, would be installed over the waste lagoon area and the most recently active landfill area. The site topography would be modified by regrading and installing a retaining wall to allow for the cap installation and conform to accepted landfill closure practices. Creek sediment contaminants would be allowed to naturally attenuate in situ.

Excavation of the buried waste lagoon would begin with the removal of debris overlying the area. The debris would be sorted to remove large metallic and foreign matter. The remainder would be shredded and stockpiled on site. A Ground Penetrating Radar survey of the area would be performed to locate any drums which may be present in the area. Any drums located would be removed during the excavation of impacted soils.

The ash resulting from the soil incineration would be solidified, if necessary, to prevent leaching of metals. Stabilization of the ash would be accomplished by adding cement kiln dust, lime, or other appropriate material to the ash. The solidified ash would then be disposed of onsite beneath the cap. Regrading and capping would be performed to minimize the infiltration of surface water into the excavation area.

Ground water collection and treatment would also be performed by installation of an interceptor trench north and parallel to the East Fork of Mill Creek. The system would discharge ground water to an onsite treatment system consisting of two activated carbon adsorption vessels for removal of organic contaminants. Treated water from this system would discharge to the East Fork of Mill Creek under a National Pollution Discharge Elimination System permit or to the Butler County Publicly Owned Treatment Works. A slurry wall would be installed near the northern site boundary to minimize ground water recharge from upgradient and to de-water the contaminated soils in the capped landfill. Ground water flowing into the site from the upgradient north would be diverted on the northern side of the slurry wall via an interceptor trench (containing appropriate granular backfill) running along the entire length of the slurry wall.

In addition, the other common remedial elements previously described would also be implemented. These include: institutional controls; alternate water supply; ground water diversion; surface and storm water diversion and flood control; and, ground water and surface water run-off monitoring. The Present Value Cost of Alternative 2 would be $28,700,000.

Alternative 3: Consolidation and Capping of Soils; Collection and Above-Ground Treatment of Ground Water

Under this alternative, impacted soils throughout the site would be consolidated beneath a common multi-media cap as described under Alternative 2. Creek sediments would be left to naturally attenuate in-situ.

A ground water collection and treatment system would also be installed to capture impacted ground water and leachate. This system would be identical to that presented under Alternative 2. A slurry wall would be installed near the northern site boundary to minimize ground water recharge from upgradient, and to de-water the contaminated soils in the capped landfill.

The other common remedial elements described previously will also be implemented. These include: ground water diversion; institutional controls; alternate water supply; surface water and storm water diversion and flood control; and, monitoring of ground water and surface water runoff. The Present Value Cost of Alternative 3 would be approximately $15,500,000.

Alternative 4: Consolidation and (Solid Waste) Capping of Soils; Collection and Above-Ground Treatment of Ground Water

Alternative 4 would consist of all the elements presented under Alternative 3, including consolidation and capping of impacted soils, collection and on-site treatment of ground water and institutional actions. Alternative 4 would however, differ from Alternative 3 regarding the type of barrier layer to be used. Under Alternative 4, the barrier layer would consist of a single-media clay cap, complying with Ohio Administrative Code 3745-27-11 (Construction Specifications for Closure of Sanitary Landfills). The Present Value Cost of Alternative 4 would be $14,800,000.

Alternative 5: Removal and On-Site Treatment of Buried Waste Lagoon Soils; Site Capping; Soil Vapor Extraction; Collection and Above-Ground Treatment of Ground Water

Alternative 5 contains all elements of Alternative 2, and also calls for treatment of capped soils via soil vapor extraction. Soil vapor extraction would be expected to remove residual volatile organic contamination from soils beneath the site cap. Because volatile organics are the most mobile constituents, the benefits of removing volatile organics may be significant. The Present Value Cost of Alternative 5 would be $29,000,000.

VII. Evaluation of Alternatives

The NCP requires that the alternatives be evaluated on the basis of the nine evaluation criteria listed below. This section discusses how the preferred alternative compares to the other alternatives considered. Remedies selected for Superfund sites must meet all nine criteria.

The U.S. EPA's Nine Evaluation Criteria For Addressing Hazardous Waste Sites are:

1. Overall protection

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

3. Long-term effectiveness and permanence

4. Reduction of toxicity, mobility, and volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost
8. State acceptance
9. Community acceptance

VIII. Comparative Analysis of Alternatives

1. Overall Protection

All alternatives under consideration (except the No Action alternative) are expected to be protective of human health and the environment in the long term.

Alternatives 3 and 4 are similar in terms of protection of human health and the environment. Each alternative would employ collection and treatment of ground water to prevent further contaminant migration from the site. Each alternative would also employ site regrading and capping to prevent further infiltration of surface water into soils and subsequent leaching of contaminants from soils to ground water. However, Alternative 4 would use a solid waste (single-media) cap and Alternative 3 would use a hazardous waste (multi-media) cap. This difference is not expected to significantly affect their protectiveness of human health and the environment. Contaminant mobility, however, would be reduced significantly by capping the site with a multi-media rather than a single-media cap; this is because infiltration of surface water would be less with a multi-media cap, thereby minimizing leachate generation. Infiltration is reduced by 90% through a single-media cap. The proposed ground water collection and treatment system is expected to capture infiltrated surface water from either cap. Therefore, Alternatives 3 and 4 are roughly equivalent in their abilities to protect human health and the environment.

Those alternatives which provide treatment of contaminants before on-site landfilling (Alternatives 2 and 5) provide the best overall protection because the contaminants will be treated to reduce their toxicity, mobility and volume. Alternative 5, which is similar to Alternative 2, is the most protective alternative in that it involves an additional contaminant removal step of in-situ soil vapor extraction. Alternatives 2 and 5 may pose some additional short-term risks over the other alternatives in that: some organic chemicals will become mobile via volatilization during the excavation step; increased dust and truck traffic in the area; and, the potential to encounter military ordnance allegedly buried somewhere onsite.

2. Compliance With ARARs

Federal and State ARARs for this site are outlined in Section 2.0 of the Feasibility Study document. ARARs are addressed in three categories: chemical-specific, action-specific, and location-specific.

Chemical Specific: All the alternatives are expected to exceed chemical-specific ARARs for surface water and groundwater.

All the alternatives, except the No Action Alternative call for a ground water collection and treatment system to ensure that no further surface water degradation occurs. All surface water quality ARARs would be complied with for all remedial alternatives except Alternative 1.

The site ground water would exceed chemical-specific ARARs under all five alternatives. However, all alternatives except the No Action alternative would use a ground water collection and treatment system to prevent contaminant migration. Treated ground water would be in compliance with ARARs prior to discharge, but in-situ ground water concentrations would be reduced appreciably only by removal and treatment of impacted soils under Alternatives 2 and 5. Onsite ground water would remain at levels exceeding ARARs due to residual soil contamination, even under Alternatives 2 and 5. This soil contamination would be expected to cause leaching into ground water, resulting in a continuing need for onsite treatment. However, the additional step of soil vapor extraction under Alternative 5 would reduce the amount of residual soil contamination in the waste lagoon area that would be available to contribute to the groundwater contamination.

In-situ ground water contaminants would not be significantly reduced for either of the onsite disposal and capping scenarios of Alternatives 3 and 4. Although offsite migration of contaminants is prevented via the ground water collection and treatment system, elevated levels of contaminants in ground water above ARARs would remain indefinitely, resulting in a continuing need for this system.

Action-Specific ARARs: These ARARs will be complied with by all but Alternative 4, which uses a solid waste cap for the site. If materials on the site are determined to be hazardous waste (either listed or characteristic), capping the site would not comply with OAC 3745-27. All other aspects of this alternative, and all other alternatives would be in compliance.

Location-Specific ARARs: All aspects of all alternatives would be in compliance with location-specific ARARs.

3. Long-Term Effectiveness and Permanence

Alternatives which employ treatment as a primary remedial action for soils (Alternatives 2 and 5) are considered to be more effective in the long-term and more permanent. Alternatives which employ containment as a primary remedial action for soils (Alternatives 3 and 4) will result in the need for more long-term controls. Although some residual contamination is expected to be present after implementation of Alternative 2 or 5, the amount of residual environmentally mobile contamination onsite would be considerably less than that expected from consolidation and capping of the impacted soils and landfill contents. Thus the magnitude of residual risk posed by onsite contaminants would be greater under the alternatives prescribing containment than for those prescribing treatment.

4. Reduction of Contaminant Mobility, Toxicity and Volume Through Treatment

All the alternatives (except No Action) use activated carbon adsorption for ground water treatment; therefore, the alternatives are equal in terms of these criteria for ground water treatment.

Soil treatment is considered in two of the alternatives -- rotary kiln incineration in Alternatives 2 and 5 and soil vapor extraction in alternative 5. Rotary-kiln incineration would significantly reduce contaminant mobility, toxicity and volume. If air emission controls are used also, treatment via soil vapor extraction would also reduce contaminant mobility, toxicity and volume. Thus, the alternatives that treat soil are considered to more effectively reduce contaminant mobility, toxicity and volume. Further, subsequent treatment of residual soil contamination with soil vapor extraction will further reduce contaminant mobility, toxicity and volume.

Contaminant mobility would be reduced significantly by capping the site with a multi-media rather than single-media cap. With a multi-media cap, infiltration of surface water would be minimized, thereby minimizing leachate generation.

5. Short-Term Effectiveness

Alternatives 2 and 5 are considered to be less protective of human health and the environment over the short-term period than Alternatives 3 and 4. This risk would result from possible uncontrolled releases of vapor phase organic compounds during excavation of the buried waste lagoon. An air model was developed in the Feasibility Study to evaluate the potential impacts of an open excavation. Results indicate that even under the worse case scenarios, the risks would be minimal. Onsite engineering controls and site security would further minimize any risks. All other alternatives are expected to be equally effective in the short-term.

6. Implementability

All of the alternatives under consideration are equally implementable. Implementation of Alternatives 2 and 5 would require lead time for the manufacture, installation and conduct of trial burns and sampling prior to the operation of the incinerator. The other alternatives and the remaining aspects of Alternatives 2 and 5 would need considerably less time to implement.

7. Cost

The alternatives can be ranked by cost as follows: Alternative 1 (No Action) has no associated cost. Alternative 4 is least expensive, followed in increasing order of magnitude, by Alternatives 3, 2 and 5. Based on a 30-year operating life, the estimated net Present Value Costs for technology and implementation range from $14,800,000 for consolidation, containment and single-layer capping, to $29,000,000 for partial soil excavation, incineration, multi-media capping and soil vapor extraction.

8. State Acceptance

The State of Ohio supports the preferred alternative for the remedial clean up.

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record-Of-Decision for the Skinner Landfill site.

IX. The Preferred Alternative

The U.S. EPA and OEPA prefer Alternative 5 for the remediation of this site. This alternative involves the removal and treatment of buried waste lagoon soils, collection and treatment of ground water leachate, consolidation and capping of other impacted soils with treated soils, and institutional controls. Impacted soils from the buried waste lagoon, and other hot spots encountered during subsequent investigations, would be excavated and treated onsite via rotary-kiln incineration. Debris overlying the buried waste lagoon and impacted soils from elsewhere onsite would not be treated onsite. These materials would be excavated, consolidated, and capped with a multi-media cap. Treated soil from this process would be stabilized to reduce leaching of the metals, and capped with a hazardous waste cap. Soil vapor extraction would be performed after capping to remove residual volatile organic contaminants from unsaturated zone soils.

The soil vapor extraction system is estimated to consist of six extraction wells, a vacuum pump, and an air emissions control system. A vacuum pump would induce air flow through the impacted soils. As the air passes over the impacted soils, volatile organic contaminants are volatilized into the air and are drawn out of the soils through the extraction wells. Extracted air is then pumped through an air emissions control system to reduce levels of contaminants prior to discharge. A regenerable dual-bed activated carbon adsorption system would be used to control air emissions. As previously described, ground water collection, treatment, and discharge to Mill Creek, as well as other institutional controls would be implemented.

The initial capital costs of Alternative 5, which includes materials and installation fees of all remedial components would be approximately $22,900,000. The annual operating costs are estimated to be $400,000. The total project cost is approximately $29,000,000.

In summary, Alternative 5 will substantially reduce current and future risks to human health and the environment at the site by excavating and treating the principal threats and other less contaminated materials remaining at the site. Any risks associated with this alternative would be short-term in nature and ultimately balanced by the long-term protectiveness of this alternative. The U.S. EPA guidance entitled: "Conducting Remedial Investigations/ Feasibility Studies for CERCLA Municipal Landfill Sites" (February 1991), defines a hot spot as large enough that its remediation would significantly reduce the risk posed by the overall site, but small enough that it is reasonable to consider removal and treatment. The U.S. EPA believes that a hot spot defined as those waste lagoon sediments that exceed 10^{-4} excess lifetime cancer risk and any drums nests encountered through the course of excavating the waste lagoon sediments, meet the above requirements because of the following reasons:

1. Since the majority of the hazardous waste is believed to be disposed in the waste lagoon, removal of the waste lagoon sediments using the above criteria would significantly reduce the risk posed by the overall site, by eliminating a significant source of hazardous substances.

2. The remaining waste would pose a risk equivalent to or less than the risks posed by the landfill contents.

3. The volume associated with the 10^{-4} criteria estimated at 17,000 cubic yards, is small enough that it is reasonable to consider removal and treatment.

Furthermore, the preferred alternative is believed to provide the best balance with respect to the nine evaluation criteria. Based on available information, the U.S. EPA and Ohio EPA believe the preferred alternative will be the most protective of human health and the environment, comply with ARARs, would be cost-effective, and would use permanent solutions and alternative treatment technologies to the maximum extent practical. Because this remedy uses incineration and vapor extraction to destroy organic contaminants, and stabilization to immobilize inorganic contaminants, it would also meet the statutory preference for a remedy that involves treatment as a principal element.

In addition to the preceding description, future investigations at the site are inherent in the scope of this remedy. Two areas of the site, for which limited information exists, are the northwest corner of the site above the Duck Pond and the buried valley source on the Skinner property. This area and other portions of the site where conditions may change will be further investigated. Any new and significant information discovered during these investigations will be made available to the public and factored into the remedial planning process.

X. Community Participation

For a complete description of the investigation and the alternatives under consideration for the site, interested persons can review the documents available at the following information repositories:

Union Township Library
7900 Cox Road
West Chester, Ohio 65069
(513) 777-3131
Hours: Monday-Friday, 10:00 am - 8:30 pm
Saturday, 10:00 am - 5:00 pm

The Administrative Record, which contains all of the documents that EPA will use to select the final cleanup remedy for the site, is located at the following address:

U.S. EPA, Region 5
Docket Room
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
Hours: Monday-Friday, 9:00 am - 5:00 pm

Written comments will be accepted during a public comment period held between April 27 and May 27, 1992. Members of the community are encouraged to attend a public meeting on May 20, 1992 at 7:00 p.m., at the Union Township Hall to discuss the proposed alternatives for remediating contamination at the site. Verbal comments will be recorded during the meeting. Comments received during the public meeting will be addressed in a Responsiveness Summary, which will be included in the Record of Decision (ROD) and will be made public in the information repository after the ROD is signed.

If you have comments or questions about the Skinner Landfill site, please address them to:

Cheryl L. Allen
Community Relations Coordinator
U.S. EPA, (P-19J)
Office of Public Affairs
77 West Jackson Street
Chicago, Illinois 60604-3590
(312) 353-6196

Sheila A. Sullivan
Remedial Project Manager
U.S. EPA, (HSRM-6J)
Office of Superfund
77 West Jackson Street
Chicago, Illinois 60604-3590
(312) 886-5251

Toll Free Number: 1-800-621-8431
(9:00 a.m. - 4:30 p.m. CST)

GLOSSARY

Applicable or Relevant and Appropriate requirements (ARARs) - Federal, State and local environmental and public health laws with which remedial actions must comply.

Baseline Risk Assessment - A study conducted to determine the associated short and long-term current and future risks posed to public health and the environment if no remedial actions are undertaken.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - A Federal law passed in 1980 and revised in 1986 by the Superfund Amendments and Reauthorization Act. CERCLA created a special tax that goes into a trust fund, commonly known as "Superfund", to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Dioxins - Toxic chemical compounds which are usually generated as a by-product of chemical production processes, combustion processes, auto exhaust, and wood treating operations.

Furans - See Dioxins above

Ground Water - The water beneath the earth's surface that flows through soil pores and rock openings.

Inorganic Compounds - Chemical compounds that are composed of mineral materials, including salts and minerals such as iron, aluminum, mercury, and zinc.

Leachate - A liquid (usually water from rain or snow) that has percolated through wastes and contains components of those wastes.

National Priority List (NPL) - U.S. EPA's list of top priority hazardous waste sites that are eligible for federal money under Superfund.

National Contingency Plan (NCP) - The Federal regulation that sets the framework for the Superfund program. The NCP identifies the governmental organizations involved in the remedial response, outlines their roles and responsibilities, and discusses the interrelationships of these organizations. In addition, the NCP provides guidelines for planning and conducting response activities.

Organic Compounds - Chemical compounds composed primarily of carbon, including materials such as solvents, oils, and pesticides.

Permeability - The ease with which ground water moves through earth materials. Movement is controlled by the size and shape of spaces between these materials.

Polychlorinated Biphenyls (PCBs) - A group of organic compounds related by their basic chemical structure. They are highly resistant to degradation, but have a tendency to be retained in body tissue. They where widely used in electrical capacitors, transformers, and other products in the U.S. before 1980.

Present Value Cost - An economic term used to describe today's cost for a Superfund cleanup and reflect the discounted value of future costs. A present value cost estimate includes construction and future operation and maintenance costs. U.S. EPA uses present value costs when calculating the cost of alternatives for long-term projects.

Record of Decision (ROD) - a document signed by EPA's Regional Administrator, outlining the selected remedy for a Superfund site. The ROD includes the Responsiveness Summary, which addresses concerns presented to EPA during the public comment period.

Sediment - Material that settles to the bottom of a stream, creek, lake, or other body of water.

Surface Water - Streams, lakes, ponds, rivers or any other body of water above the ground.

Semi-volatile Organic Compounds - Organic chemicals that vaporize less readily than VOCs. These compounds include many polynuclear aromatic hydrocarbons and pesticides.

Slurry Wall - A civil engineering technique commonly used at hazardous waste landfills to prevent movement of water soluble and mobile contaminants by restricting ground water movement around or beneath the contaminant source. The most common slurry wall construction method is to excavate a trench and backfill with low permeability mixtures of soil or cement and bentonite clay.

Volatile Organic Compounds (VOCs) - Organic chemicals, such as methylene chloride and benzene, that vaporize easily. Some VOCs found at the site include carbon tetrachloride, vinyl chloride, benzene, and chloroform.